Application of Artificial Intelligence in Dentistry

Year: 2020 | Citations: 331 | Authors: T. Shan, F. R. Tay, L.S. Gu

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Abstract

Artificial intelligence (AI) is a technology that utilizes machines to mimic intelligent human behavior. To appreciate human-technology interaction in the clinical setting, augmented intelligence has been proposed as a cognitive extension of AI in health care, emphasizing its assistive and supplementary role to medical professionals. While truly autonomous medical robotic systems are still beyond reach, the virtual component of AI, known as software-type algorithms, is the main component used in dentistry. Because of their powerful capabilities in data analysis, these virtual algorithms are expected to improve the accuracy and efficacy of dental diagnosis, provide visualized anatomic guidance for treatment, simulate and evaluate prospective results, and project the occurrence and prognosis of oral diseases. Potential obstacles in contemporary algorithms that prevent routine implementation of AI include the lack of data curation, sharing, and readability; the inability to illustrate the inner decision-making process; the insufficient power of classical computing; and the neglect of ethical principles in the design of AI frameworks. It is necessary to maintain a proactive attitude toward AI to ensure its affirmative development and promote human-technology rapport to revolutionize dental practice. The present review outlines the progress and potential dental applications of AI in medical-aided diagnosis, treatment, and disease prediction and discusses their data limitations, interpretability, computing power, and ethical considerations, as well as their impact on dentists, with the objective of creating a backdrop for future research in this rapidly expanding arena.